

CLAIMS

What is claimed is:

1. A method for fabricating a ferroelectric capacitor in an integrated circuit, the method comprising:

fabricating a metal-oxide-semiconductor transistor on a substrate;

depositing an insulating layer on the metal-oxide-semiconductor transistor;

depositing a conducting layer on the insulating layer using a low temperature process;

and

depositing a ferroelectric layer on the conducting layer using a low temperature process.

2. The method as set forth in Claim 1, wherein the depositing of an insulating layer comprises depositing a silicon dioxide layer.

3. The method as set forth in Claim 1, wherein the depositing of a conducting layer on the insulating layer comprises:

depositing a first conducting layer on the insulating layer; and

depositing a second conducting layer on the first conducting layer.

4. The method as set forth in Claim 3, wherein the depositing of a first conducting layer comprises depositing a platinum layer.

5. The method as set forth in Claim 3, wherein the depositing of a first conducting layer comprises depositing an iridium layer.

6. The method as set forth in Claim 3, wherein the depositing of a second conducting layer comprises depositing a layer of conducting oxide.

7. The method as set forth in Claim 6, wherein the depositing of a layer of conducting oxide comprises depositing a layer of lanthanum nickel oxide (LaNiO₃).

8. The method as set forth in Claim 6, wherein the depositing of a layer of conducting oxide comprises depositing a layer of iridium oxide (IrO_2).
9. The method as set forth in Claim 7, wherein the depositing of a layer of lanthanum nitric oxide comprises depositing lanthanum nickel oxide by sputtering at a temperature of about 350°C .
10. The method as set forth in Claim 7, wherein the depositing of a layer of lanthanum nickel oxide comprises causing the lanthanum nickel oxide to form a perovskite phase.
11. The method as set forth in Claim 1, wherein the depositing of a ferroelectric layer comprises depositing a lead zirconate titanate layer.
12. The method as set forth in Claim 11, wherein the depositing of a lead zirconate titanate layer comprises depositing a lead zirconate titanate layer using metal organic chemical vapor deposition.
13. The method as set forth in Claim 11, wherein the depositing of a lead zirconate titanate layer comprises depositing a lead zirconate titanate layer using a process that operates at a temperature substantially in a range of about 450°C to about 550°C .
14. A semiconductor element formed using the method of Claim 1.
15. A semiconductor element formed using the method of Claim 3.
16. A manufacturing method for fabricating a ferroelectric capacitor in an integrated circuit, the method comprising:
 - fabricating a metal-oxide-semiconductor transistor on a substrate;
 - depositing an insulating layer on the metal-oxide-semiconductor;
 - depositing a conducting layer on the insulating layer using a process to cause at least part of the conducting layer to form a perovskite phase; and

depositing a ferroelectric layer on the conducting layer using a process to cause at least part of the ferroelectric layer to form a perovskite phase.

17. The manufacturing method as set forth in Claim 16, wherein the depositing of a conducting layer on the insulating layer comprises:

depositing a first conducting layer on the insulating layer; and
depositing a second conducting layer on the first conducting layer.

18. The manufacturing method as set forth in Claim 16, wherein the depositing of a conducting layer on the insulating layer is performed using a low temperature process.

19. The manufacturing method as set forth in Claim 18, wherein the depositing of a ferroelectric layer on the conducting layer is performed using a low temperature process.

20. A semiconductor element formed using a manufacturing method as set forth in Claim 16.

21. A semiconductor element formed using a manufacturing method as set forth in Claim 18.

22. The manufacturing method as set forth in Claim 16, wherein the depositing of a ferroelectric layer comprises depositing a lead zirconate titanate layer.

23. A semiconductor element formed using a manufacturing method as set forth in Claim 22.

24. A semiconductor element produced by the manufacturing method as set forth in Claim 22, wherein the depositing of a lead zirconate titanate layer comprises depositing a lead zirconate titanate layer using metal organic chemical vapor deposition.

25. A semiconductor element produced by the manufacturing method as set forth in Claim 22, wherein the depositing of a lead zirconate titanate layer comprises depositing a lead zirconate titanate layer using a process that operates at a temperature substantially in a range of about 450 °C to about 550 °C.